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DASINEURA WAHLENBERGIAE, A NEW SPECIES OF GALL MIDGE (DIPTERA: CECIDOMYIIDAE) DAMAGING SHOOT TIPS OF *WAHLENBERGIA STRICTA* (CAMPANULACEAE) IN SOUTH AUSTRALIA

by PETER KOLESIK*

Summary

KOLESIK, P. (1998) *Dasineura wahlenbergiae*, a new species of gall midge (Diptera: Cecidomyiidae) damaging shoot tips of *Wahlenbergia stricta* (Campanulaceae) in South Australia. *Trans. R. Soc. S. Aust.* **122**(4), 147-151, 30 November, 1998.

A new South Australian gall midge, *Dasineura wahlenbergiae*, that damages shoot tips of *Wahlenbergia stricta* (R. Br.) Sweet, a common plant of grassy habitats in Australia and New Zealand, is described. Two leaves of the shoot tip of the host plant are malformed into a globular, hollow, hairy, partially discoloured gall, 2-5 mm in diameter. The male, female, pupa and larva of the new species are described. The new gall midge is the fourth *Dasineura* species known from Australia.

KEY WORDS: Gall midge, Cecidomyiidae, *Dasineura wahlenbergiae* sp. nov., *Wahlenbergia stricta*, South Australia.

Introduction

The new gall midge described here was found in malformed shoot tips of the tall blue bell, *Wahlenbergia stricta* (R. Br.) Sweet (Campanulaceae) at Morialta Conservation Park, near Adelaide. *Wahlenbergia stricta* is a perennial herb, 100-900 mm high with large, blue flowers and is common at grassy sites in various vegetation types throughout Australia and New Zealand (Smith 1986). The plants grow on slopes at the Morialta Conservation Park and in the spring the shoot buds of many of them are modified into globular, hairy galls. Some plants have all their shoot tips galled and consequently do not reproduce.

Materials and Methods

Shoot tip galls on *Wahlenbergia stricta* were collected at Morialta Conservation Park on 15 September, 1996 and brought to the laboratory where a few of the galls were peeled open and the developmental stages of the gall inducer examined. Some of the galls contained young larvae, some mature larvae, some cocoons and others were empty. The cocoons contained either larvae or pupae. A small number of the mature larvae was preserved in 70% ethanol. A few cocoons were torn open and the larvae and pupae preserved as above. The majority of the galls was laid on wet sand within a pot to allow them to develop into adults. Pupation took place within the galls. Emerged adults were preserved in 70% ethanol. Canada balsam mounts of the type series were prepared for microscopic examination according to the technique outlined by Kolesik (1995). Measurements refer to the holotype and paratypes. The type specimens, and other material retained in ethanol, are deposited in the South Australian Museum, Adelaide [SAMA], the Australian National Insect Collection, Canberra [ANIC] and the Swedish Museum of Natural History [SMNH]. Dry samples of the galls are deposited in the State Herbarium of South Australia, Adelaide [SHSA].

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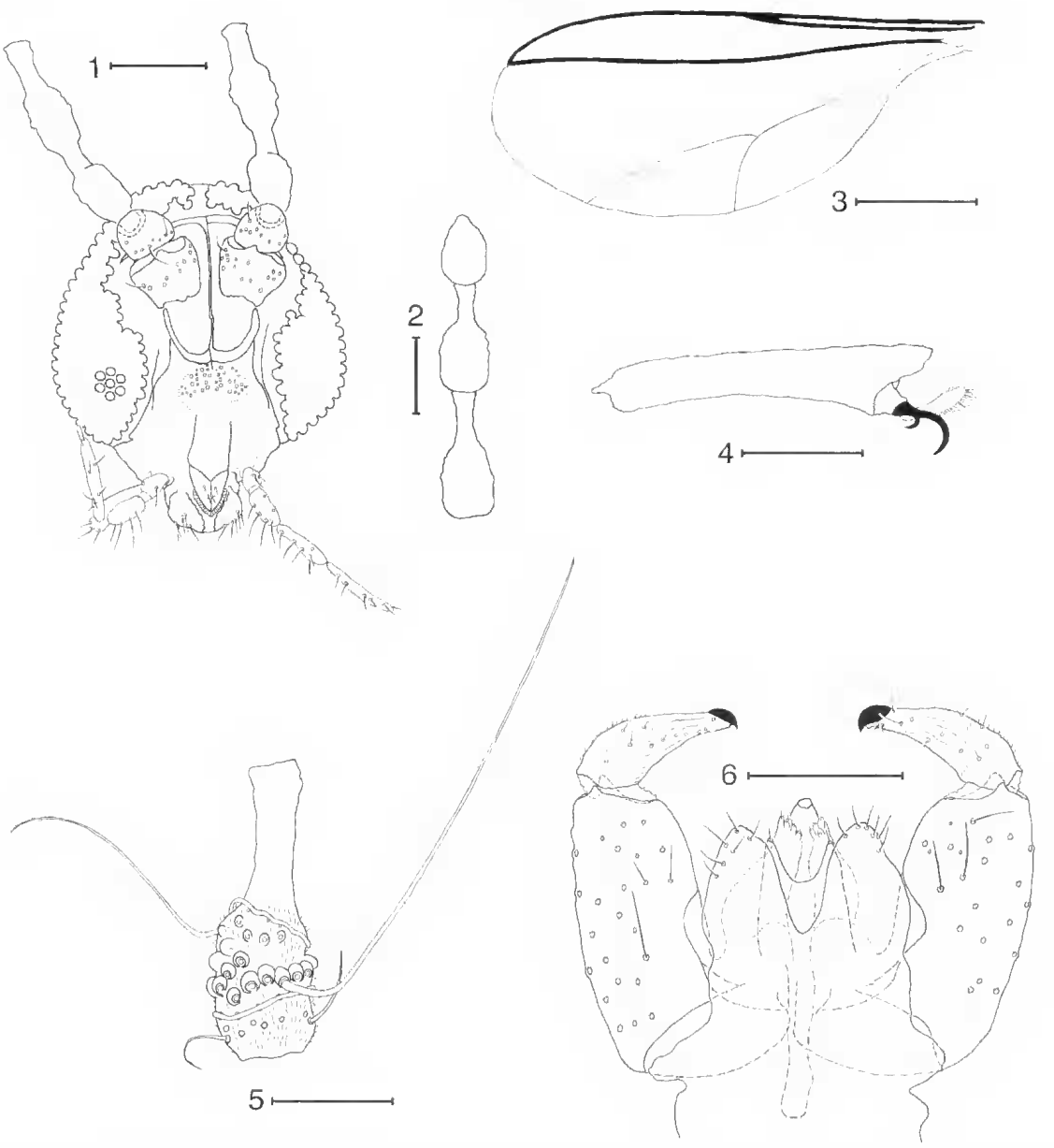
Genus *Dasineura* Rondani, 1840

Dasineura Rondani, 1840: 12 & 17
Proposed type species *Tipula sisymbrii* Schrank, 1803: Gagné *et al.* (1997)

Dasineura is a large, cosmopolitan genus of some 200 species containing Oligotrophini with four-segmented palpi, toothed tarsal claws, an R_5 wing vein that meets C anterior to the wing apex, and the female eighth tergite divided into two longitudinal sclerites.

Dasineura wahlenbergiae sp. nov.
(FIGS 1-15)

Holotype: ♂, Morialta Conservation Park, South Australia [34° 54' S, 138° 44' E], 20.ix.1996, P. Kolesik, reared from a shoot tip gall of *Wahlenbergia stricta* (R. Br.) Sweet collected 15.ix.1996, 121384 [SAMA].



Figs 1-6. Male of *Dasineura wahlenbergiae* sp. nov. 1. Head in frontal view. 2. Last three flagellomeres. 3. Wing. 4. Last tarsal segment with claw and empodium. 5. Sixth flagellomere. 6. Genitalia in dorsal view. Scale bars = 100 µm 1, 6; 50 µm 2, 4, 5; 500 µm 3.

Paratypes: 3♂♀, 3 pupae [SAMA, I21385-I21390], 1♂, 2♀♀, 2 pupae [all ANIC], same data but emerged 17.-25.ix.1996; 3 larvae [SAMA], 3 larvae [ANIC], collected with holotype.

Other material: 3♂♀ [SMNH], same data as holotype but emerged 20.-25.ix.1996; 37 larvae, 5 pupae within cocoons [SMNH], collected with holotype; gall [SHSA, AD99747199], collected with holotype.

Description

Male (Figs 1-6)

Colour: eyes black; head, thorax and abdomen orange-red; legs, antennae, palpi, setae and scales grey; halteres orange brown.

Head: Antenna: scape square in frontal view, pedicel spheroid; 16 flagellomeres, first and second fused, necks as long or slightly longer than nodes; circumfila comprising two transverse and two longitudinal bands. Palpus four-segmented, segments progressively longer. Eye facets rounded, close together except on vertex where small area of no facets separates the eyes. Labella tapered distally, laterally with 6 setae. Frons with 23-26 setae per side.

Thorax: Wing length 2.1 mm (2.0-2.1, n = 2), width 0.9 mm (0.8-0.9); R_5 joining C anteriorly to apex; R_1 joining C slightly anteriorly to mid-length; Rs not obvious. Claws toothed, empodia as long as claws.

Abdomen: Tergites 1-8 with pair of sensory setae in anterior corners, tergites 1-7 with single setal row posteriorly and scales scattered evenly, tergite 8 in form of narrow, sclerotised, anterior band, without setae. Sternites 2-8 with pair of sensory setae anteriorly, setae in wide band anteriorly and narrower band posteriorly, area between two bands of setae more weakly sclerotised. Genitalia: gonocoxite cylindrical, setose and setulose; gonostylus tapered distally, sparsely setose, setulose basally up to ⅔ of its length ventrally and ½ dorsally, sparsely striate beyond, bearing distal comb; cerci large, each with several setae apically, setulose; hypoproct deeply and widely divided, with one seta on each lobe, setulose; parameres sheathing aedeagus, with subglobular distensions dorsobasally, with 4-5 setose papillae apically; aedeagus long, stout.

Female (Figs 7-10)

Colour: as in male.

Head: 16 flagellomeres, cylindrical, with necks ½-⅓ node's length, circumfila comprising two transverse and two longitudinal bands, distal transverse band with loop, circumfilar attachment points very dense. Labella with 7-10 setae laterally, frons with 22-28 setae laterally.

Thorax: Wing length 2.1 mm (2.0-2.3, n = 5), width 0.8 mm (0.8-0.9).

Abdomen: Tergites 1-8 with pair of sensory setae in anterior corners, tergites 1-7 with single setal row posteriorly and scales scattered evenly, tergite 8 divided into two longitudinal sclerites. Sternites 2-7 with pair of sensory setae anteriorly, setae in wide band anteriorly and narrower band posteriorly, area between two bands of setae more weakly sclerotised, sternite 8 not developed. Ovipositor: protractile, elongate, 0.7 mm (0.6-0.7) long (anterior limit of genital chamber to terminal tip distance), 31% (29-35) of wing length; cerci fused medially into single, prolonged, terminal lamella, setose and setulose; hypoproct with two setae, setulose.

Pupa (Fig. 11)

Colour: antennal horns brown at apex, remaining parts yellow. Length 2.0 mm (1.8-2.1, n = 5). Antennal horns small, pointed. Frons on each side: three frontal papillae two of them setose, asetose one sometimes lacking; three asetose lateral facial papillae. Cephalic papilla with seta 194 µm (189-201) long. Prothoracic spiracle 230 µm (220-244) long, trachea ending at apex. Integument of abdominal segments covered with spiculae slightly longer dorsally, second through seventh abdominal segments with group of dorsal spines on anterior half. First through eighth abdominal segments with two pairs of dorsal asetose papillae, one pair of setose pleural papillae, two pairs of asetose ventral papillae.

Last instar larva (Figs 12-14)

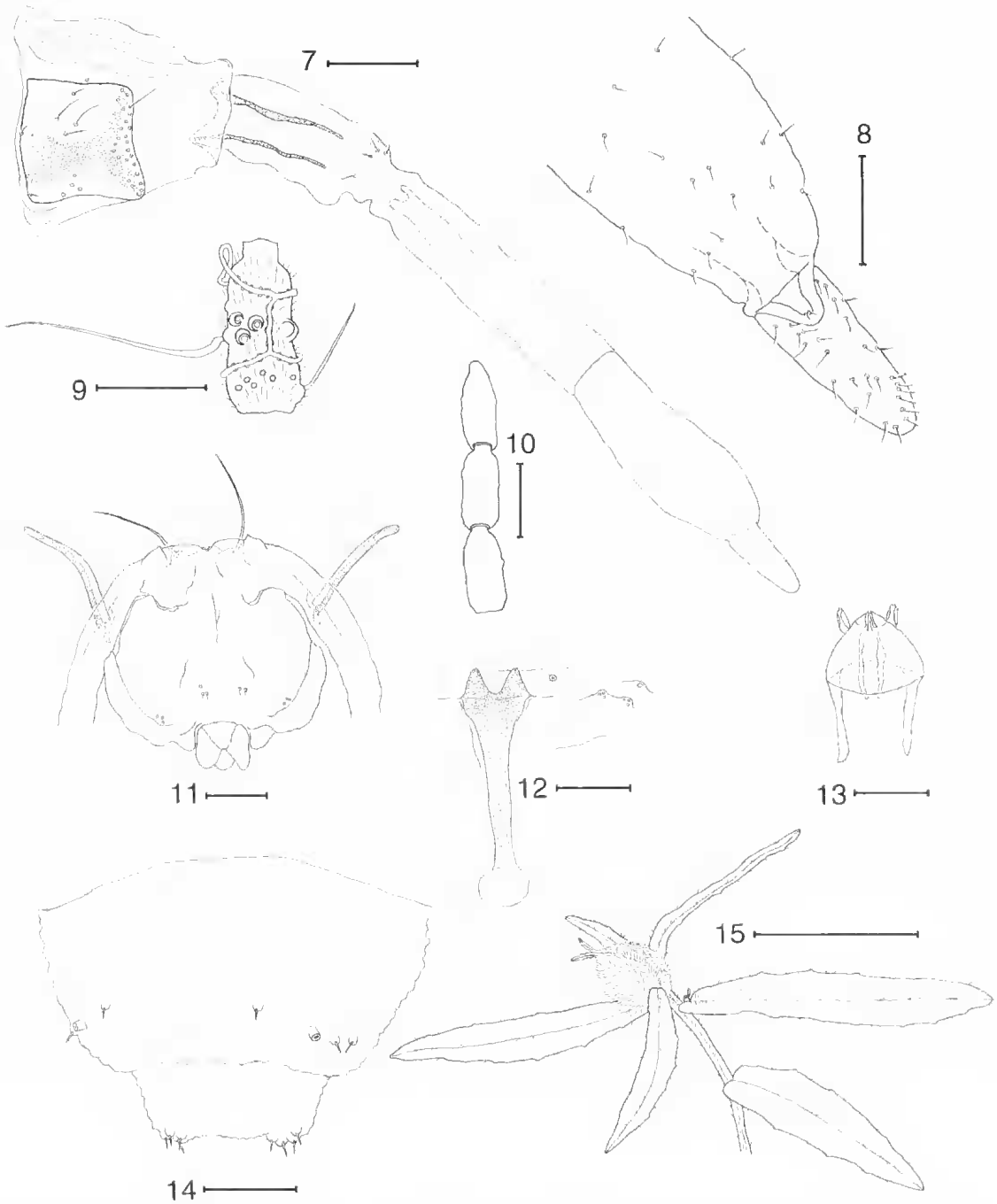
Colour: red. Length 2.4 µm (2.0-2.8, n = 6). Integument covered with rounded plates about 10 µm in diameter, ventrally with several transverse rows of spiculae on anterior half of thoracic and abdominal segments. Head with postero-lateral apodemes as long as head length. Spatula bilobed, with long shaft, length 147 µm (117-169). Papillae characteristic of *Dasineura* larva (Sylvén 1975).

Etymology

The name *wahlenbergiae* is derived from the generic name of the host plant.

Gall and biology

The new gall midge modifies two leaves of the shoot tip of *Wahlenbergia stricta* into a globular, hollow, hairy, partially discoloured gall, 2-5 mm in diameter (Fig. 15). On 15 September, 1997, at Morialta Conservation Park most galls contained mature larvae, but some galls contained young larvae, some cocoons with larvae or pupae within or



Figs 7-15. *Dasineura wahlenbergiae* sp. nov.: 7-10 female, 11 pupa, 12-14 larva, 15 infestation symptoms. 7. Posterior end of abdomen in dorsal view. 8. Posterior end of ovipositor in ventral view. 9. Sixth flagellomere. 10. Last three flagellomeres. 11. Anterior part in ventral view. 12. Spatula with adjacent papillae. 13. Head. 14. Two terminal segments in dorsal view. 15. Gall on *Wahlenbergia stricta* (R. Br.) Sweet. Scale bars = 100 µm 7, 11, 14; 50 µm 8-10, 12, 13; 10 mm 15.

empty cocoons, and others contained no remnants of the gall inducer. Up to 20 larvae were found within a gall. The adults reared in this study originated from larvae pupated within the galls.

Discussion

Dasineura, the largest genus of Cecidomyiidae, comprises species occurring in all zoogeographical regions of the world. Four species are known from Australia: *D. acaciaelongifoliae* (Skuse, 1890) (Gagné & Marohasy 1993) and *D. dielsi* Rübsaamen (1916) which damage flowers of *Acacia limgifolia* (Andr.) Wild. (Mimosaceae) and *A. cyclops* Cunn. ex Don respectively, *D. hybanthi* Kolesik & Skuhravá (1997) which is an inquiline in flower galls on *Hybanthus floribundus* (Lindley) Muell. (Violaceae) induced by an unknown gall midge, and the new species described here. *Dasineura wahlenbergiae* sp. nov. belongs to Sylvén's (1975) biological group II of gall midges whose larvae are primary gall inducers, feed gregariously and pupate in both the soil and the plant. The adults of the new species reared in the present study originated from larvae that pupated within galls, but the fact that some galls were found empty with neither cocoon remnants nor parasitoids within suggests that part of the larval population pupates in the soil. This conforms with the behaviour of Sylvén's (1975) biological group II. *Dasineura hybanthi*, the only other Australian species of this genus described in detail, belongs to group III of gall midges whose larvae are inquilines, feed gregariously and pupate in the soil. The new species differs from *D. hybanthi* in several morphological characters. In *D. wahlenbergiae*, the wing vein R_5 is not obvious, the tooth on the tarsal claw is much smaller than the claw, the female flagellomeres are much longer than wide, in the male genitalia the gonostylus is tapered distally, the male cerci and parameres are nearly as long as the aedeagus, and the larva has no medial papillae between the terminal papillae. In *D. hybanthi*, the R_5 is evident, the tooth on the tarsal claw is nearly as large as the claw, the female flagellomeres are as long as wide, in the male genitalia the gonostylus is about the same width through its entire length, the male cerci and parameres are much shorter than the aedeagus, and the larva has several medial setose papillae between the terminal papillae.

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References

GAGNÉ, R. J., HARRIS, K. M., SKUHRAVÁ, M., SOLINAS, M. and SYLVÉN, E. (1997) *Dasineura* Rondani, 1840 (Insecta, Diptera): proposed designation of *Tipula sisymbrii* Schrank, 1803 as the type species. (Case 2986). *Bull. Zool. Nomen.* **54**, 92-94.

& MAROHASY, J. (1993) The gall midges (Diptera: Cecidomyiidae) of *Acacia* spp. (Mimosaceae) in Kenya. *Insecta Mundi* **7**, 77-124.

KOLESIK, P. (1995) A new species of *Lasiopteryx* Fel. (Diptera: Cecidomyiidae) on *Eucalyptus fasciculosa* in South Australia. *J. Aust. ent. Soc.* **34**, 147-152.

& SKUHRAVÁ, M. (1997) *Dasineura hybanthi* spec. nov. a new inquiline species of Cecidomyiidae (Diptera) from galls on *Hybanthus floribundus* (Violaceae) in Australia. *Studia Dipt.* **4**, 240-246.

RÜBSAAMEN, E. H. (1916) Beitrag zur Kenntnis aussereuropäischer Gallmücken. *Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin* 1915, 431-481.

SKUSE, F. A. A. (1890) Diptera of Australia. Nematocera. Supplement I. *Proc. Linn. Soc. NSW* (2nd series) **5**, 373-413.

SMITH, P. J. (1986) Family Campanulaceae pp. 1376-1383 *In* Jessop, J. P. & Toelken, H. R. (Eds) "Flora of South Australia, Part 1 (Polemoniaceae - Compositae)" (South Australian Government Printing Division, Adelaide).

SYLVÉN, E. (1975) Study on relationships between habits and external structures in Oligotrophidi larvae (Diptera, Cecidomyiidae). *Zool. Scripta* **4**, 55-92.